

# User-Centric Argument Mining with ArgueMapper and Arguebuf

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## 1. Introduction

Contrary to unstructured representations like natural language texts, *argument graphs* enable advanced analysis of an argument's structure which consists of linked Argumentative Discourse Units (ADUs). Since most existing works dealing with the creation of such graphs are primarily geared towards *experts* and neglect the needs of *developers* and *laymen*, we propose (i) an intuitive, stable, and scalable *tool* (ArgueMapper)<sup>2</sup> for creating and browsing graph-based representations of arguments by experts and laymen alike and (ii) a straightforward *format* (Arguebuf)<sup>3</sup> enabling developers to build related tools and exchange data more easily. Both ArgueMapper and Arguebuf are available under the permissive MIT license and are open to any kind of contribution.

## 2. ArgueMapper: A Tool for Manual Argument Mining

This section will highlight some features of ArgueMapper compared to existing tools like Online Visualization of Arguments (OVA) [1] and MonkeyPuzzle [2].

**Intuitive Interface** Our tool (see Figure 1) complies with Nielsen's usability heuristics [4] to ensure as little friction as possible for laymen. At the same time, it is similar enough to OVA to be familiar to experts as well.

**Optimized for Mobile Devices** ArgueMapper is fully functional on smartphones and tablets by providing finger-optimized buttons and gesture controls.

**Auto-Layout** We combined ideas of OVA and MonkeyPuzzle by implementing a hierarchical automatic layout algorithm that runs entirely in the user's browser.

**State Management** To prevent loss of unsaved data, the app's state is always stored in the browser's storage. In addition, we also fully support undo/redo functionality.

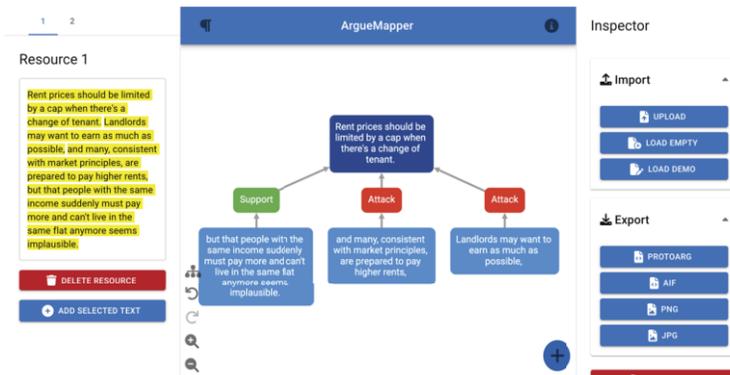
**Modern Development Stack** To simplify contributions, we built ArgueMapper using modern tooling like TypeScript and React. It has a modular architecture and thus may be embedded into other systems as well.

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<sup>2</sup><https://github.com/recap-utr/arguemapper>, Demo at <https://arguemapper.uni-trier.de>

<sup>3</sup><https://github.com/recap-utr/arguebuf>



**Figure 1.** Three-pane layout of ArgueMapper with source texts on the left, the graph in the middle, and additional functions in the right sidebar. Example taken from the Microtexts corpus [3].

### 3. Arguebuf: A Format for Argument Graphs

In conjunction with ArgueMapper, we developed the format Arguebuf to address limitations of existing ones like Argument Interchange Format (AIF) [5] and SADFace [6].

**Simple Specification** Arguebuf is specified using the concise and intuitive language Protocol Buffers (Protobuf), meaning that it is easily expandable. Graphs may be serialized to JSON or a more efficient binary format for use with gRPC.

**Superset of AIF and SADFace** It is possible to transform every AIF graph or SADFace document into our new format without any information loss.

**Code Generation** Protobuf automatically creates native code for most programming languages. Among others, this enables code completion and type checks in IDEs.

**Supercharged Python Implementation** We provide an optimized Python client with advanced analysis features—for instance, importing legacy formats, converting from/to AIF, and integrating with Graphviz, NetworkX, and spaCy.

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### References

- [1] Bex F, Lawrence J, Snaith M, Reed C. Implementing the argument web. *Communications of the ACM*. 2013 Oct;56(10):66-73.
- [2] Douglas J, Wells S. Monkeypuzzle - Towards Next Generation, Free & Open-Source, Argument Analysis Tools. In: CMNA@ICAIL. CEUR; 2017. .
- [3] Peldszus A, Stede M. An annotated corpus of argumentative microtexts. In: *Argumentation and Reasoned Action*. vol. 2. Lisbon, Portugal: College Publications; 2015. p. 801-15.
- [4] Nielsen J. *Usability Engineering*. San Francisco, CA, USA: Morgan Kaufmann Publishers Inc.; 1994.
- [5] Chesñevar C, McGinnis, Modgil S, Rahwan I, Reed C, Simari G, et al. Towards an argument interchange format. *Knowledge Engineering Review*. 2006 Dec;21(4):293-316.
- [6] Wells S. Datastores for Argumentation Data. In: *Proceedings of the 20th Workshop on Computational Models of Natural Argument*. CEUR Workshop Proceedings. CEUR; 2020. p. 31-40.